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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,409	08/23/2006	Noel Alfred Warner		8956
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Noel A Warner 40 High House Drive Lickey Birmingham, B45 8ET UNITED KINGDOM			EXAMINER VELASQUEZ, VANESSA T	
			ART UNIT 1793	PAPER NUMBER
			MAIL DATE 09/05/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/590,409

Applicant(s)

WARNER, NOEL ALFRED

Examiner

Vanessa Velasquez

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Status of Claims

Claims 1-12 are presented for examination on the merits.

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy of GB 0412105.9 has been received and placed in the file of record.

Specification Objection

The disclosure is objected to because of an informality. Page 20 of the specification labels a water seal as being part **2**. It appears that this is a typographical error as the water seal is part **52**. Appropriate correction is required.

Claim Objections

Claims 7 and 8 are objected to because for containing the phrase "in claim 1 and as claimed in any of the preceding claims." The phrase is redundant as it is understood that the liquid scrap referred to in claims 7 and 8 refers to the liquid scrap mentioned in claims on which claims 7 and 8 depend. Appropriate correction is required.

Claim Rejections - 35 USC § 112, Second Paragraph

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims are replete with terminology that is relative in degree or manner and/or imprecise in absence of the definitions in the instant specification. Use of this type of terminology renders the claims ambiguous and unclear. Examples are as follows:

Claim 1: "straightforward," "reduced," "adaptation," "many times," "steel product rate"

Claim 2: "deleterious"

Claim 5: "treated individually in isolation"

Claim 6: "reduced," "very much higher," "approaching the technical upper limit of available commercial refractories," "almost saturated," "many times"

Claim 7: "additional special steps," "ameliorate," "reduced"

Claim 8: "very low"

Claim 9: "essentially as a quiescent melt"

Claim 10: "additional features incorporated if"

Claim 11: "high intensity," "commercially proven"

Claim 12: "essentially saturated"

Claim 13: "high pressure"

Claims 3 and 4 are likewise rejected for depending from a rejected claim.

Claim 9 is also objected for not clearly stating the claimed invention. The claim refers to claim 6 but is written in independent form. Appropriate clarification is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Warner ("Conductive heating and melt circulation in pyrometallurgy," *Mineral Processing and Extractive Metallurgy*, Vol. 112, No. 3, pp. 141-154).

Regarding claim 1, Warner describes a method for making refined iron from scrap iron (Figure 1). The method continuously processes molten steel in an in-line fashion (page 142, column 2, sub-section (i)). The metal is transported in an apparatus comprising melt circulation loops that make use of gas-lift snorkels, siphons, and lances to transport molten steel from swimming pool reactor to swimming pool reactor (page 143, column 2; also Figure 3). The swimming pool reactors allow for purge gas to be flowed through the molten metal (page 144, column 2). The siphons in the apparatus comprise an upleg and downleg (page 147, column 1). An adaptation of RH degassing techniques is implemented in the circulation of the melt (page 147, column 1), which may be circulated in the range of 20-200 tons per minute (page 147, column

1). It is possible to produce 500,000 tons per year of steel according to current technologies (page 147, column 1). The process described in Warner is designed such that surface nucleation and growth of carbon monoxide bubbles is avoided (page 143, column 1, sub-section (ii)). Vacuum degassing is also not necessary due to the height of the molten steel in the body of the reservoir of the siphon (page 147, column 1, paragraph to the right of Figure 4).

Regarding claim 9, Warner teaches a graphite heater (page 147, Figure 4, 6) placed above liquid metal that keeps the metal molten. Warner further teaches that in the case of liquid steel, the reaction between carbon and oxygen is neither explosive nor active. Thus, in the absence of an explosive or active reaction, the liquid steel would inherently behave like a quiescent melt (page 147, bottom of column 1 and top of column 2).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Warner ("Conductive heating and melt circulation in pyrometallurgy," *Mineral Processing and Extractive Metallurgy*, Vol. 112, No. 3, pp. 141-154) in view of Grott (US 3,529,067).

Regarding claims 2-4, Warner does not specify the specific impurities contained in the scrap steel that is refined. However, Grott, also drawn to a refining process, teaches that elements such as zinc, tin, and copper are metallic impurities often undesired in refined steel (col. 3, lines 13-23; col. 8, Table B). Grott further teaches that contaminants may additionally comprise organic coatings such as paint, oil, and grease (col. 2, lines 15-20). Because foodstuffs and vegetable matter are organic substances, they are encompassed by the term organic as used by Grott. Therefore, it would have been obvious to one of ordinary skill in the art to refine steel contaminated with elements such as zinc, tin, and copper and other organic matter in the process of Warner because said elements and substances are undesirable in refined steel, as taught by Grott.

Regarding claim 5, Warner does not teach a sorting step as all scrap or fines, coal, and flux are fed simultaneously into the process described therein (see Figure 1, wherein the composite charge comprises a variety of elements).

8. Claims 6-8 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Warner ("Conductive heating and melt circulation in pyrometallurgy," *Mineral Processing and Extractive Metallurgy*, Vol. 112, No. 3, pp. 141-154) in view of Warner (GB 2 193 975 A, hereafter, GB '975), and further in view of Grott (US 3,529,067).

Regarding claim 6, Warner does not disclose removing specific impurities such as zinc, copper, and tin. Grott, also drawn to a refining process, teaches that elements such as zinc, tin, and copper are metallic impurities often undesired in refined steel (col. 3, lines 13-23; col. 8, Table B). GB '975 teaches a countercurrent gas treatment method for removing volatile impurities from molten metal. The method comprises using a non-reactive gas or reactive gas (e.g., sulfur, chlorine, or hydrogen) to lift molten metal through a lance into a reduced-pressure vessel (page 2, col. 1, lines 5-10). The reduced-pressure atmosphere causes the molten metal to disperse into droplets which flow upwards and then fall back down due to gravity (page 2, col. 1, lines 10-15). Gas is purged from the floor beneath in an upward direction, flowing countercurrently relative to the metal droplets that are flowing downward (page 2, col. 1, lines 14-21). Volatile impurities are thereby removed by the process (page 2, col. 1, lines 18-21). The column may be packed with steel scrap or lump coke to further enhance the contact between gas and liquid (page 2, col. 1, lines 33-49). The removal of sulfides is also possible (page 2, col. 2, lines 18-21). The process described by GB '975 is not limited to copper matte and can be applied to remove volatile impurities in other metallurgical melts (page 2, col. 2, lines 94-99). Furthermore, the process described by GB '975 is efficient because it conserves energy (page 1, col. 1, lines 22-29). Therefore, it would

have been obvious to one of ordinary skill in the art to apply the method of GB '975 in the process of Warner because of its efficiency and ability to refine molten metal in a self-contained apparatus. In addition, it would have been obvious to one of ordinary skill in the art to volatilize the impurities of copper and tin as taught by Grott because those metals are undesirable in refined steel. It would furthermore have been obvious to one of ordinary skill in the art to repeat or arrange in series the apparatus of GB '975 into a series of purification columns so that each impurity is removed in series (i.e., one after the other), resulting in an ultra-pure metal.

Still regarding claim 6, Warner teaches that the melt is desulfurized (page 142, col. 2, sub-section (i)).

Still regarding claim 6, Warner teaches that iron scrap is preheated (Figure 1) but does not teach that zinc is vaporized. Grott teaches that elements such as zinc are metallic impurities often undesired in refined steel (col. 3, lines 13-23; col. 8, Table B). Therefore, it would have been obvious to one of ordinary skill in the art to utilize the preheating step as a means for removing zinc because it increases the efficiency of the process of Warner, removes an unwanted impurity as taught by Grott, and makes subsequent purification easier.

Still regarding claim 6, Warner teaches optionally sending the refined molten steel to an ultra low carbon tower refiner or to a continuous casting facility (page 143, col. 1, sub-section (iii)).

Regarding claim 7, Warner teaches that the growth of carbon monoxide is prevented (page 143, col. 1, sub-section (ii)).

Regarding claim 8, the method is capable of processing steel throughputs at less than 0.5 megatons per year (page 147, col. 1).

Regarding claim 12, purge inert gas floods the swimming pool chamber, which contains molten steel (page 144, col. 2; Figure 3).

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Warner ("Conductive heating and melt circulation in pyrometallurgy," *Mineral Processing and Extractive Metallurgy*, Vol. 112, No. 3, pp. 141-154) in view of Warner (GB 2 193 975 A, hereafter, GB '975), and further in view of Grott (US 3,529,067) and Tom et al. (US 4,853,148).

Regarding claim 10, Warner in view of GB '975 and Grott do not teach removal of chlorine using a scrubber. Tom et al. teach a method for drying gaseous halide compounds. In one exemplary process, a sodium carbonate scrubber is used to dry the halide compound (col. 15, lines 15-21). Scrubbers are used to purify vapors by eliminating at least one constituent therefrom. Therefore, it would have been obvious to one of ordinary skill in the art to remove any halide compounds from the process of Warner in view of GB '975 and Grott using the scrubber disclosed by Tom et al. because the steel disclosed in the process would be further refined and purified.

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Warner ("Conductive heating and melt circulation in pyrometallurgy," *Mineral Processing and Extractive Metallurgy*, Vol. 112, No. 3, pp. 141-154) in view of Warner (GB 2 193 975 A,

hereafter, GB '975), and further in view of Grott (US 3,529,067) and Robson et al. (US 2,760,770).

Regarding claim 11, Warner in view of GB '975 and Grott do not teach implementing a mechanical rotor system. However, Robson et al. teach an apparatus of condensing zinc. The apparatus comprises a blast furnace **11** attached to chambers containing rotors **22** and **23**, and minimizes heat loss (col. 3, lines 44-53). Therefore, it would have been obvious to one of ordinary skill in the art to utilize the zinc blast furnace of Robson et al. in the process of Warner in view of GB '975 and Grott because the blast furnace of Robson et al. conserves heat generated, thereby decreasing energy consumption.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vanessa Velasquez whose telephone number is (571)270-3587. The examiner can normally be reached on Monday-Friday 8:30 AM-6:00 PM ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached at 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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